Message

From: "Crafford, Thomas C (DNR)" ["Crafford, Thomas C (DNR)" <tom.crafford@alaska.gov>]
Sent: 3/31/2010 3:47:46 PM
To: Phil North/R10/USEPA/US@EPA
Subject: RE: Tailings Density

Phil,

In some of their previous designs they'd considered multiple tailings disposal facilities. The single large facility idea has, I think, been largely if not wholly abandoned because of the discovery of the deep east orebody. Thoughts were, as I understand it, that its mining would destabilize the back dam necessary for the single large facility. The multiple facilities idea is then dictated by the topography and the availability of places to potentially employ as disposal sites.

Tom

-----Original Message-----
From: North.Phil@epamail.epa.gov [mailto:North.Phil@epamail.epa.gov]
Sent: Tuesday, March 30, 2010 4:39 PM
To: Crafford, Thomas C (DNR)
Subject: RE: Tailings Density

Thanks Tom. Yes,this is very helpful. I never thought that the expense of storing tailings would limit the extent of mining once it started. That's an interesting idea. Then it becomes very difficult to predict the volume of waste until the economics are done.

I also made an assumption that it would be less expensive to build one large tailings facility. Dave seemed to suggest that several facilities would be a more reasonable scenario. Do you have any thoughts about that?

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"To protect your rivers, protect your mountains."

From: "Crafford, Thomas C (DNR)" <tom.crafford@alaska.gov>

To: Phil North/R10/USEPA/US@EPA

Date: 03/30/2010 04:23 PM

Subject: RE: Tailings Density

Phil,

I don't think you said anything wrong - didn't ruffle my feathers, anyway.

As far as tailings density, I don't really know of a rule of thumb. Red Dog's tailings would certainly be a lot denser than Pebble's. A standard rule of thumb for density for granitic rocks (SG ~2.7) is, 1 ton ~= 12 cubic feet. Tailings would be less dense. Density of tails increases over time as the become progressively more consolidated and water is expelled. I expect that tails densities for a porphyry mine would probably be on the order of 140 - 150 lbs/cubic foot.

As for size of Pebble, Dave was mixing apples and oranges a bit. Yes, PLP has announced a "resource" of, I think, 10.78 billion tons. However, that's a resource that hasn't yet had economics applied to it. The minable reserve figure would certainly be less. On the other hand, Dave is correct to say that add'l reserves would likely be found, so the actual amount could approach 10-11 billion tons, depending on economics and future exploration success.

My personal opinion is that Pebble will be limited by the amount of waste it would be able to store, and that one of challenges for PLP is to design a mine that maximizes the economic return for the volume of waste.

Hope this helps,
Tom

-----Original Message-----
From: North.Phil@epamail.epa.gov [mailto:North.Phil@epamail.epa.gov]
Sent: Mon 3/29/2010 4:49 PM
To: Crafford, Thomas C (DNR)
Subject: Tailings Density

Hi Tom,
I don't envy you your role in those workshops. It is noble of you to agree to participate given the level of public hostility and lack of trust of government in regard to this project. I really should learn to keep my mouth shut.

Is there a rule-of-thumb for tailings density? What about tailings mixed with waste rock? I was interested in checking Dave Chambers assumptions about sites that would hold the volume of tailings generated from the

companies proclamations of the ore present. And I was interested in exploring areas that might hold that much waste to see what wetlands and streams might be present.

Patty said that she had talked with you about reasonable estimates of the amount of waste generated from the ore the company says is present. Is there a rule-of-thumb there too? Now they are saying 5.4 billion tons proven and 4+ inferred (I don't recall the number). Is it not reasonable to assume that all of this will be mined?

Phil

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